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[54] **GEOLOCATION METHOD AND APPARATUS FOR SATELLITE BASED TELECOMMUNICATIONS SYSTEM**

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[57] **ABSTRACT**

A method is provided for determining the geolocation of a mobile terminal within a telecommunications satellite system. The system supports first and second forward communications links from first and second earth stations through first and second satellites to a common mobile terminal. The method includes receiving, at the mobile terminal, first and second forward link communications signals from the first and second earth stations and, based thereon, obtaining synchronization differential data. The synchronization differential data may include timing and frequency synchronization data necessary to maintain synchronization between the first and second communications at the mobile terminal. The mobile terminal transmits the synchronization differential data to the first earth station over the return link. The first earth station receives communications signals from the mobile terminal and based thereon calculates return link synchronization data. The earth station further calculates at least first and second geoposition lines, along which the mobile terminal is positioned, based on the return link synchronization data and the synchronization differential data received from the mobile terminal. The first and second geoposition lines define a point of intersection at which the mobile terminal is located.

15 Claims, 6 Drawing Sheets